

REMARKS

In the Office action mailed on October 4, 2005, the Examiner considered claims 21 to 28. Claims 21 to 25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,003,355 to Yasuda *et al.* ("Yasuda") in view of European Patent Publication No. 0 149 247 to Takagi *et al.* ("EP '247"). Claim 26 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Yasuda in view of EP '247 and U.S. Patent No. 4,531,394 to Turley *et al.* ("Turley"). In addition, the Examiner objected to claims 27 and 28 as being dependent upon a rejected base claim. The Examiner noted on page 4 of the Office action that claims 27 and 28 would be allowable if rewritten in independent form.

By means of the present Amendment, claim 21 has been amended to clarify that the plurality of force generation devices provide adjustable whipping of their respective back up roll and work roll via the respective support beam. Support for this amendment can be found at, for example, page 5 of the originally filed specification. Applicants submit that no new matter has been introduced by this amendment.

In view of the following remarks, Applicants respectfully request reconsideration and withdrawal of all grounds of rejection and objection.

Rejection of Claims 21-26 under 35 U.S.C. § 103(a)

Claims 21-25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable in view of the combination of Yasuda and EP '247. Claim 26, which depends indirectly from claim 21, stands rejected under 35 U.S.C. § 103(a) as being unpatentable in view of the combination of Yasuda, EP '247, and Turley. To establish a *prima facie* case of obviousness 1) there must be a motivation to combine the references, 2) there must be a reasonable expectation of success, and 3) the combination must teach or suggest all of the elements of Applicants' claims. In the present case, the cited prior art references fail to support a *prima facie* case of obviousness because the references fail to teach or suggest all of the elements of Applicants' independent claim 21. Accordingly, Applicants respectfully request reconsideration and removal of the 35 U.S.C. § 103(a) rejection of independent claim 21 and claims 22-26, which depend therefrom.

Applicants respectfully submit that none of the cited references teaches or suggests a roll stand including a plurality of force generation devices arranged along said back up rolls, said force generation devices acting on said support beams, each of said force generation devices being individually adjustable in such way as ***to provide an adjustable whipping of its respective back up roll and work roll via its support beam, wherein said back up rolls, said support beams and said plurality of force generation devices are aligned with each other so as to exert forces on said work rolls in line with said force generation devices.*** As recited in claim 21, the roll stand includes a plurality of force generation devices arranged along the back up rolls and aligned with the support beams so as to exert forces on the work rolls in line with the force generation devices. As a result, the force generation devices are adjustable so as to provide adjustable whipping of its back up roll and work roll via its support beam. In contrast to the prior art, according to the invention recited in claim 21, the force generation devices act on the support beams, which support the back up rolls fitting close to the work roll to exert forces on the work roll in line with the force generation devices.

According to the invention, in order for the whipping of the work roll and thus the roll gap to be defined precisely and evenly, it is not necessary to provide a large number of force distribution devices. Instead, by providing the support beam for evening out the force introduced by the force generation devices, only a small number of force generation devices are required which achieve even and precise whipping of the work roll without steps or other abrupt changes in the forces introduced seen along the length of the work roll. Therefore precise definition of the roll gap and even wear of the work roll is achieved with a small number of force generation devices. As such, the roll stand of the present invention requires less constructional measures in order to achieve a more precise and even definition of the roll gap.

Turning now to the prior art, Yasuda discloses a rolling mill which includes work rolls (2, 3) supported horizontally by support beams (16, 17, 18, 19). See Fig. 1 of Yasuda. The state of the art disclosed by Yasuda is based on the object to provide a rolling mill wherein work rolls (2, 3) and/or idler rolls (8, 9, 10, 11) are supported horizontally by means of static pressure bearings (12, 13, 14, 15) and which during rolling, can prevent contact between the work rolls (2, 3) or idler rolls (8, 9, 10, 11) and the static pressure bearings (12, 13, 14, 15) even under the action of excessive horizontal force. See, Abstract and Col. 3, lines 7-13 in Yasuda.

To accomplish the above objective, Yasuda includes four singular force generation devices (20, 21, 22, 23) which act on their corresponding support beams (16, 17, 18, 19). That is, there is one force generation device acting on one support beam. The force generation devices (20, 21, 22, 23) each act upon their respective support beam to move their respective support beam in a **horizontal direction** to arrange an offset of the work rolls (2, 3) in order to balance the forces acting on the work rolls and to maintain the horizontal forces exerted on the work rolls at an allowable value. See, for example, Col. 6, lines 40-51, Col. 7, lines 24-27, Col. 8, lines 40-48, and Col. 9, lines 29-46. To maintain the allowable horizontal force value, bending or tilting of the idler rolls (8, 9, 10, 11) in the horizontal plane are evened out by systematically controlling the position of the idler rolls (8, 9, 10, 11). See Col. 11, line 25 to Col. 14, line 9 and Fig. 13-16). Accordingly, in direct contrast to Applicants' claim 21, whipping of the work rolls (2, 3) by means of force generation devices (20, 21, 22, 23) via support beams (16, 17, 18, 19) is expressively prevented by Yasuda's rolling mill which evens out the position of the idler rolls to maintain an allowable horizontal force value.

In addition, Yasuda disclosed idler rolls (8, 9, 10, 11), support beams (16, 17, 18, 19) and force generation devices (20, 21, 22, 23) are not aligned with each other so as to exert forces on the work rolls (2, 3) in line with the force generation devices, as claimed by the Applicants. Rather, Yasuda's force generation devices act on the lateral ends of the static pressure bearings, which are not in line with the idler rolls (8, 9, 10, 11). See, for example, Figs. 15 and 16 in Yasuda.

The disclosures of EP' 247 and Turley do not cure the deficiencies of Yasuda. Specifically, neither EP' 247 nor Turley teaches or suggests a plurality of force generation devices acting on said support beams, each of said force generation devices being individually adjustable in such way as to provide an adjustable whipping of its respective back up roll and work roll via its support beam, wherein said back up rolls, said support beams and said plurality of force generation devices are aligned with each other so as to exert forces on said work rolls in line with said force generation device.

The disclosure of EP '247 is based on the object to provide a rolling mill which can effectively prevent the bending of the work rolls in the direction of the rolling path and which can permit a quick and precise setting of the work rolls in the designated offset position, while

facilitating the replacement of the work rolls. See, page 4, lines 8-14 of EP '247. To accomplish this goal, the rolling mill of EP '247 includes force generation devices 64, 84, and 85 that are arranged to exert a pre-stress force on support rolls 48, 96, and 95 in order to keep work roll 43 from being deflected in the horizontal direction. See, for example, page 10, lines 11-12. As a result, the force generation devices of EP '247 actually prevent whipping of the work roll 43, rather than provide for whipping of the work rolls as claimed by Applicants.

In addition, as shown in the Figures and discussed on pages 9 and 10 of EP '247, the force generation devices 64 are not aligned with the support beams 54 and the support roll 48 to exert forces on the work roll 43 in line with the force generating devices as claimed by Applicants. Rather, in contrast to Applicants' claimed invention, the force generation devices 64 act on arms 57 attached to the lateral ends of support beams 54, which are attached to the support rolls 48. See, for example, Fig. 1 in EP '247. Thus, the force generation devices 64 are not in line with the support beams 54 and support rolls 48 as claimed by Applicants.

Turley also fails to teach or suggest a plurality of force generation devices acting on said support beams, each of said force generation devices being individually adjustable in such way as to provide an adjustable whipping of its respective back up roll and work roll via its support beam, wherein said back up rolls, said support beams and said plurality of force generation devices are aligned with each other so as to exert forces on said work rolls in line with said force generation device. Turley discloses a six-high rolling mill that has side support beams which are fixed under normal operation, but release their position in the event of a mill wreck. See, Col. 6, lines 25-44, 61-68 and Col. 7, lines 1-24 in Turley. As such, the force generation devices of Turley move the support beam 50 from a fixed position in which the support rolls 28 are in contact with work roll 30 to a release position in which the force generation device 38 is no longer in contact with support beam 50 to prevent excessive force on work roll 30. Turley is silent with respect to providing a plurality of force generating devices that act on the support beams in such a way to provide adjustable whipping of its respective back up roll and work roll during rolling.

In addition, as shown in Figs. 2, 3, and 12, hydraulic piston or force generation device 38, support beam 50 and side support roll 28 are not aligned and thus do not allow for force exertion on the work roll 30 in line with the force generation device 38, as claimed by the Applicants.

Since none of the cited references, alone or in combination, teaches or suggests all of the elements of Applicants' independent claim 21, Applicants respectfully submit that claim 21 is patentable over the cited references. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the 35 U.S.C. § 103 rejection against claim 21.

Claims 22-26 depend directly or indirectly from claim 21. Applicants submit that claims 22-26 are patentable in view of the cited references for at least the same reasons claim 21 is patentable. Thus, Applicants respectfully request that the Examiner withdraw the 35 U.S.C. § 103 rejections against claims 22-26.

Objection to Claims 27 and 28

Applicants respectfully submit that claim 21 is patentable for all of the reasons discussed above. Accordingly, Applicants request the withdraw of the objection to claims 27 and 28, which depend from claim 21.

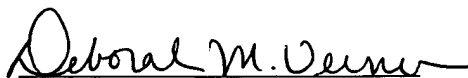
CONCLUSION

In view of the foregoing, Applicants respectfully submit that the claims 21-28 are in condition for allowance and request favorable action. The Examiner is welcome to contact Applicants' attorney at the number below with any questions.

Respectfully submitted,

March 31, 2006
Date

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